

# Core-logic Integration and ACR Application

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San Jose January 23-24, 2001



Taipei February 14-15, 2001

# Agenda

- Applications Drive Integration
- ACR Helps Reliability
- ACR Improves Performance
- ACR Eases Compatibility
- ACR Provides Flexibility
- Merits from ACR and HSP
- Summary

# Applications Drive Integration

<b>Connected PC wants</b>	<b>ACR is</b>
<b>Internet</b>	<b>Communication rich</b>
<b>Multimedia</b>	<b>Audio</b>
<b>Low price</b>	<b>Potential cost saving</b>
<b>Reliable</b>	<b>Less components</b>
<b>Save power</b>	<b>Power saving</b>
<b>Small</b>	<b>Low profile</b>

# ACR Helps Reliability

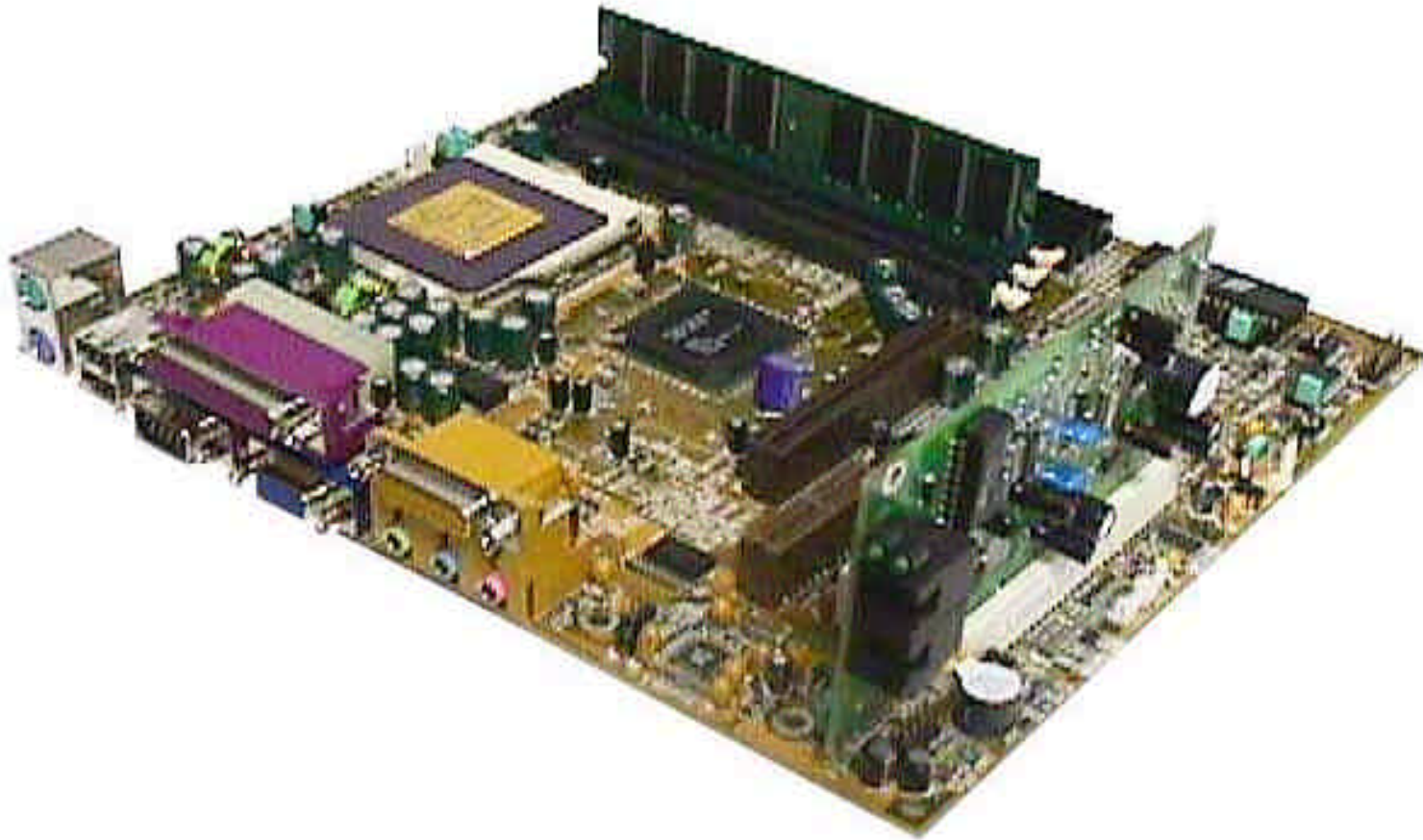
## ■ Reliability by design

- ✍ Dedicate simpler standard bus for each function
- ✍ Fewer sharing devices on the bus, reduce testing matrix
- ✍ Mixed signal and digital circuitry separation by bus
- ✍ Simpler board renders higher reliability

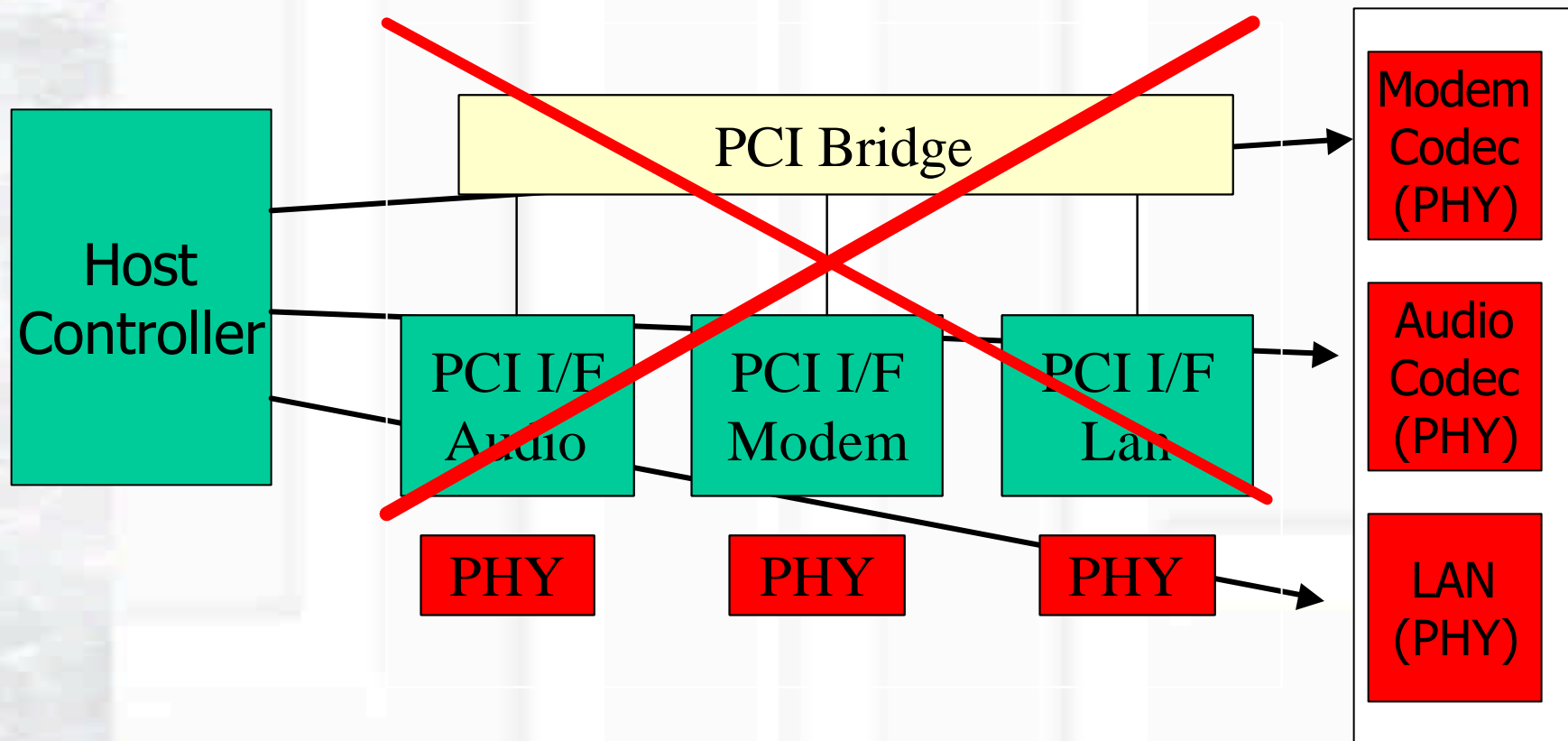
## ■ Easy remedy on the field

- ✍ Soft solutions make upgrade or bug fix easier if needed

# Motherboard Evolution



# PC Integration Path



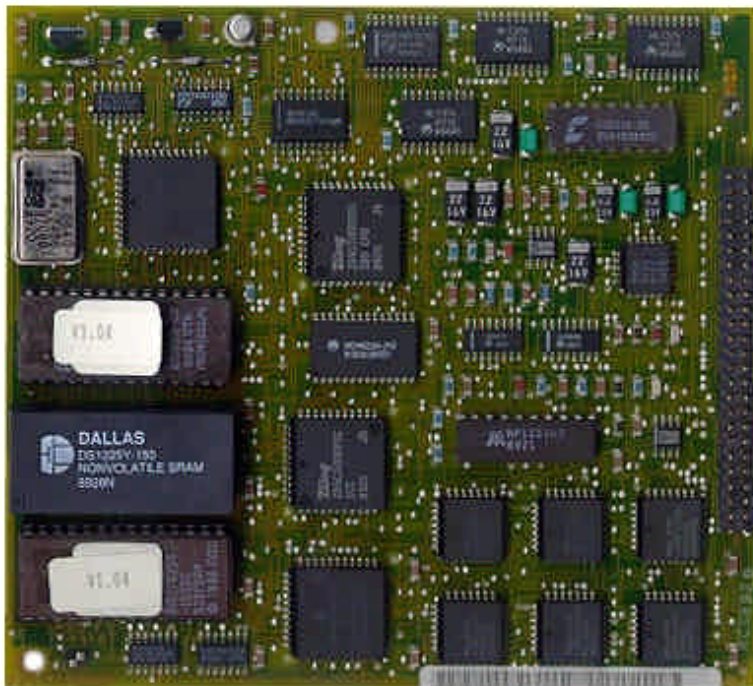


# Example: Modem Evolution

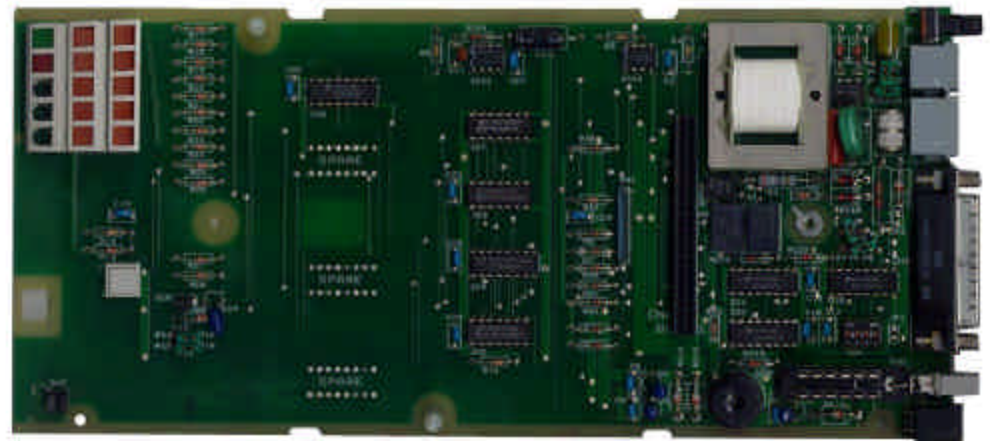


# Discrete Modem

9600 Baud Modem \$999.00



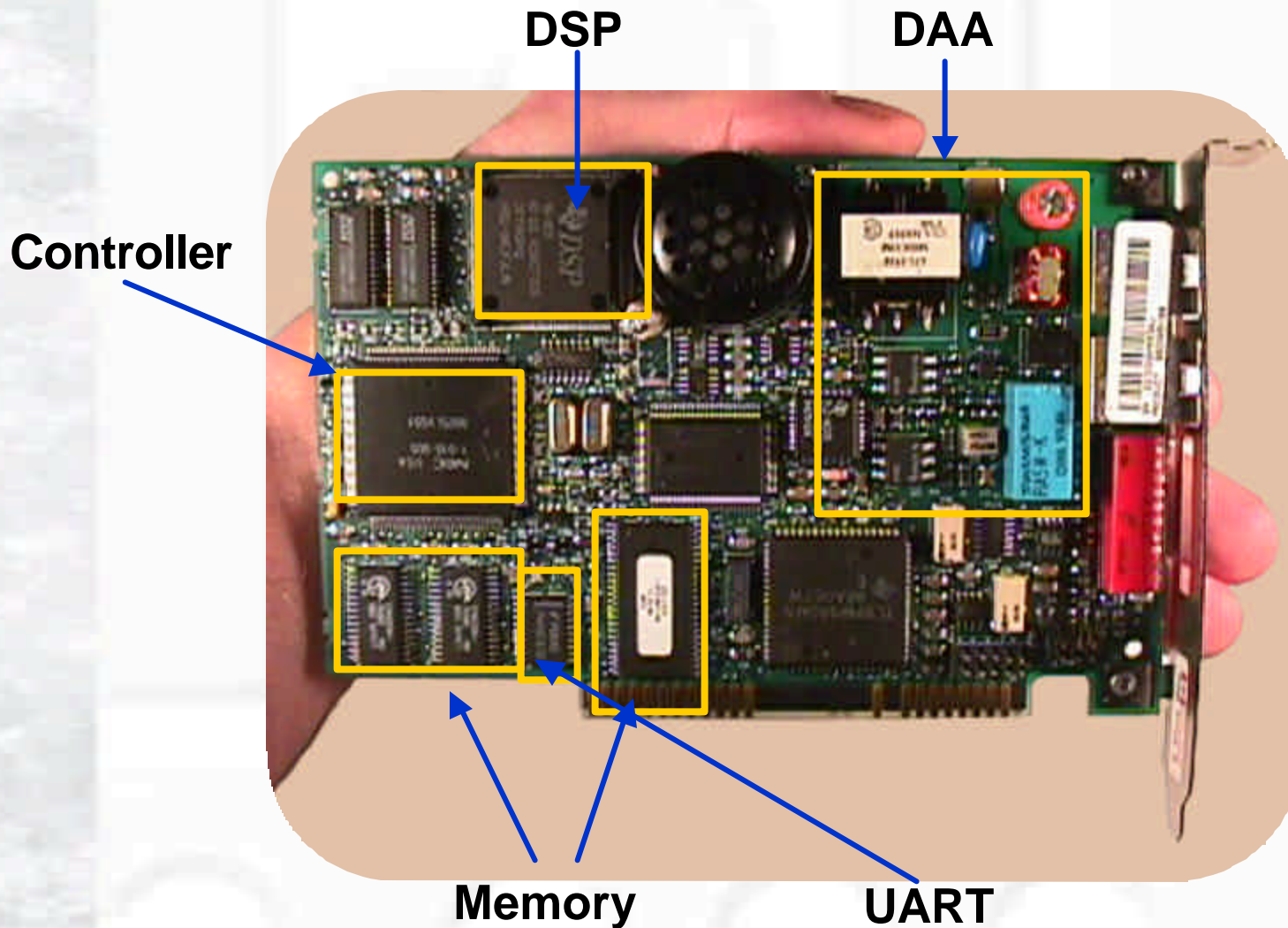
Digital Processing



DAA



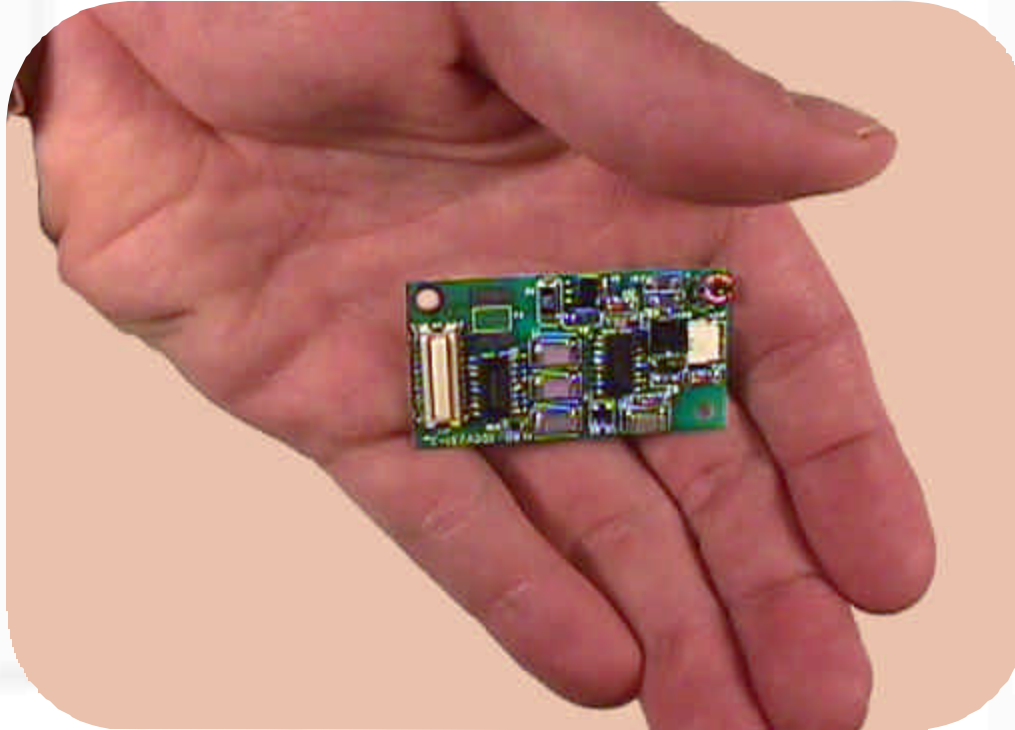
# V.32 Analog Modem @ 1995



# V.90 Analog Modem @ 2000

*40% less cost*

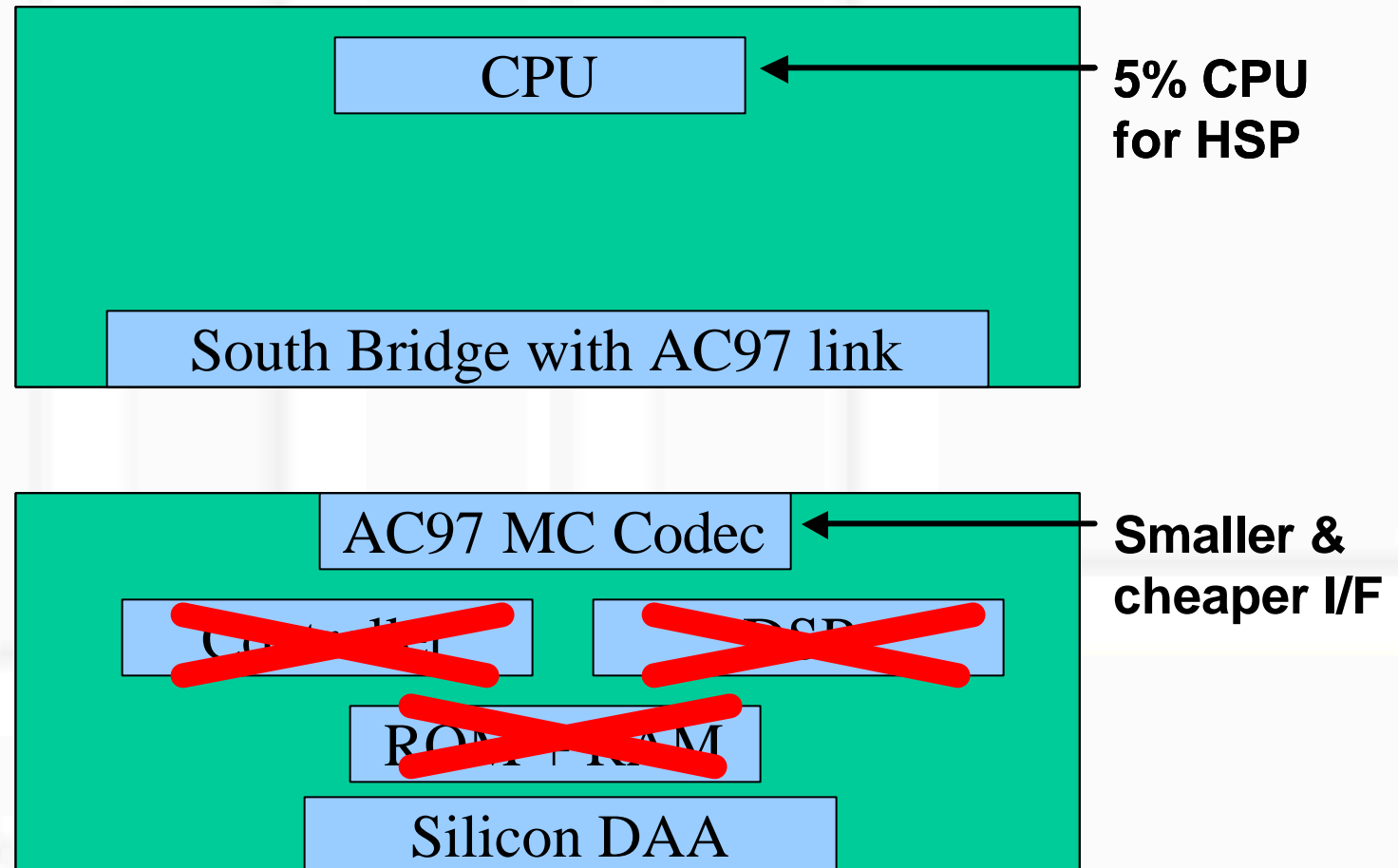
*50% less space*



*70% less power*

*HSP takes 5% PC CPU*

# Analog Modem Migration Path



AMR Soft  
Modem

# ACR Improves Performance

- **Dedicated bus for each application allows core-logic achieving balanced system architecture**
- **Serial bus is the trend for future PCs, e.g. USB, 1394, Serial-ATA, InfiniBand**

# ACR Eases Compatibility

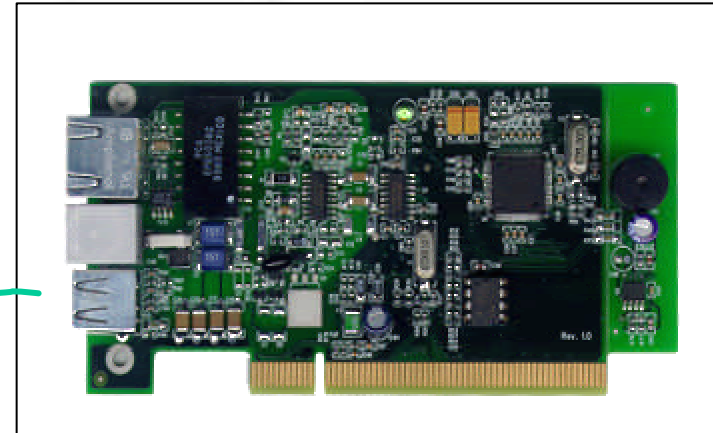
- **Leading technology providers work together on ACR**
- **Compatibility is sorted out in core-logic, motherboard, and solution levels**
- **BIOS and EEPROM provide full plug-and-play capability**
- **Clear pre-defined test assertions and tools**

# ACR Provides Flexibility

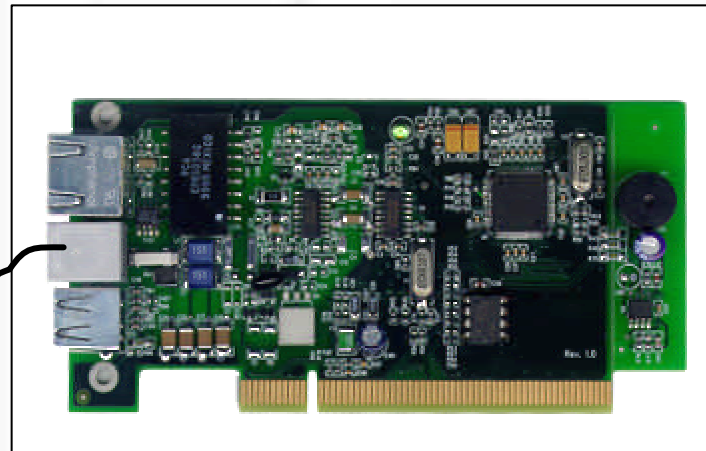
- A simple connector provides multiple buses for all communication and multimedia needs
- Systems can pair different ACR risers to meet demand of all SKUs
- Buses on ACR are scalable for future needs



# USB to DSL



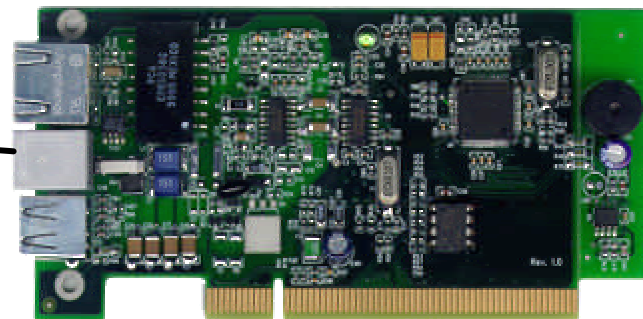
# Ethernet to Cable Modem



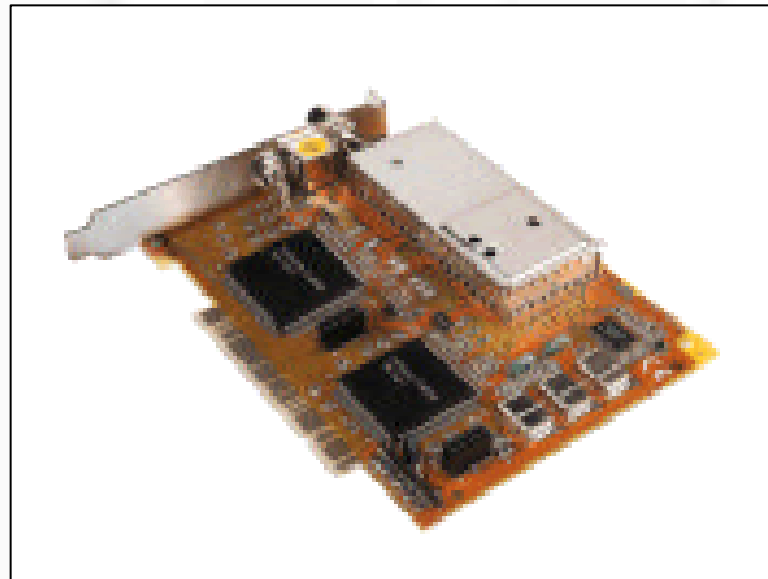
# Ethernet to DSL



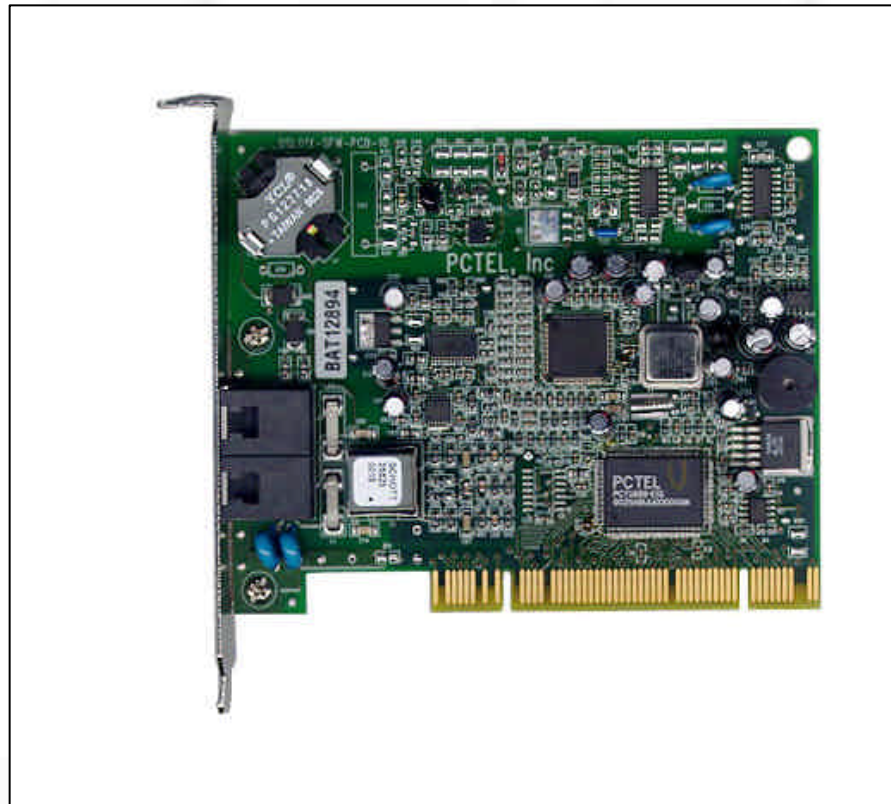
SpeedStream 5660



# Internal IPB Cable Modem



# Internal DSL IPB Modem



## Merits from ACR and HSP

- Host Signal Processing is the lowest cost solution
- CPU and core-logic advance make ACR and HSP completely feasible for broadband as well



# Summary

- **The combination of core-logic integration and ACR standard**
  - ✍ Is a natural path for PC evolution
  - ✍ Lower the cost while preserving the flexibility
- **ACR is the standard for communication-enabled platforms.**

# Core-logic Integration and ACR Application

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# Agenda

- **Evolution of Core-logic Integration**
- **Trend of Future PC's**
- **ACR Architecture**
- **Benefit of Core-logic Integration**
- **Networking with ACR**
- **Market Opportunities**
- **Summary**

# Evolution of Core-logic Integration

## ■ Discrete logic/MSI chips

- ✍ 8259, 8237, 8042, RTC
- ✍ Everything based on ISA, including memory controller

## ■ MSI/LSI chipsets

- ✍ IPC, Memory/Cache Controller, Bus interface
- ✍ PS/2, EISA, VESA Local Bus

## ■ Northbridge + Southbridge + Peripheral

- ✍ CPU Interface, Memory Interface, Peripheral Interface
- ✍ core-logic, new peripheral busses
- ✍ USB, EIDE

# Evolution of Core-logic Integration (continued)

## ■ Northbridge

- ✍ CPU Interface: Intel P5, P-II, Celeron, P-III, AMD K6-2, K7
- ✍ Graphics Interface: PCI, AGP 1x, AGP 2x, AGP 4x
- ✍ Memory Interface: FP, EDO, SDR, PC100, PC133, RDR, DDR
- ✍ Peripheral Interface: PCI-33, PCI-66, 64-bit PCI, PCI-X
- ✍ Integrated Graphics

## ■ Southbridge

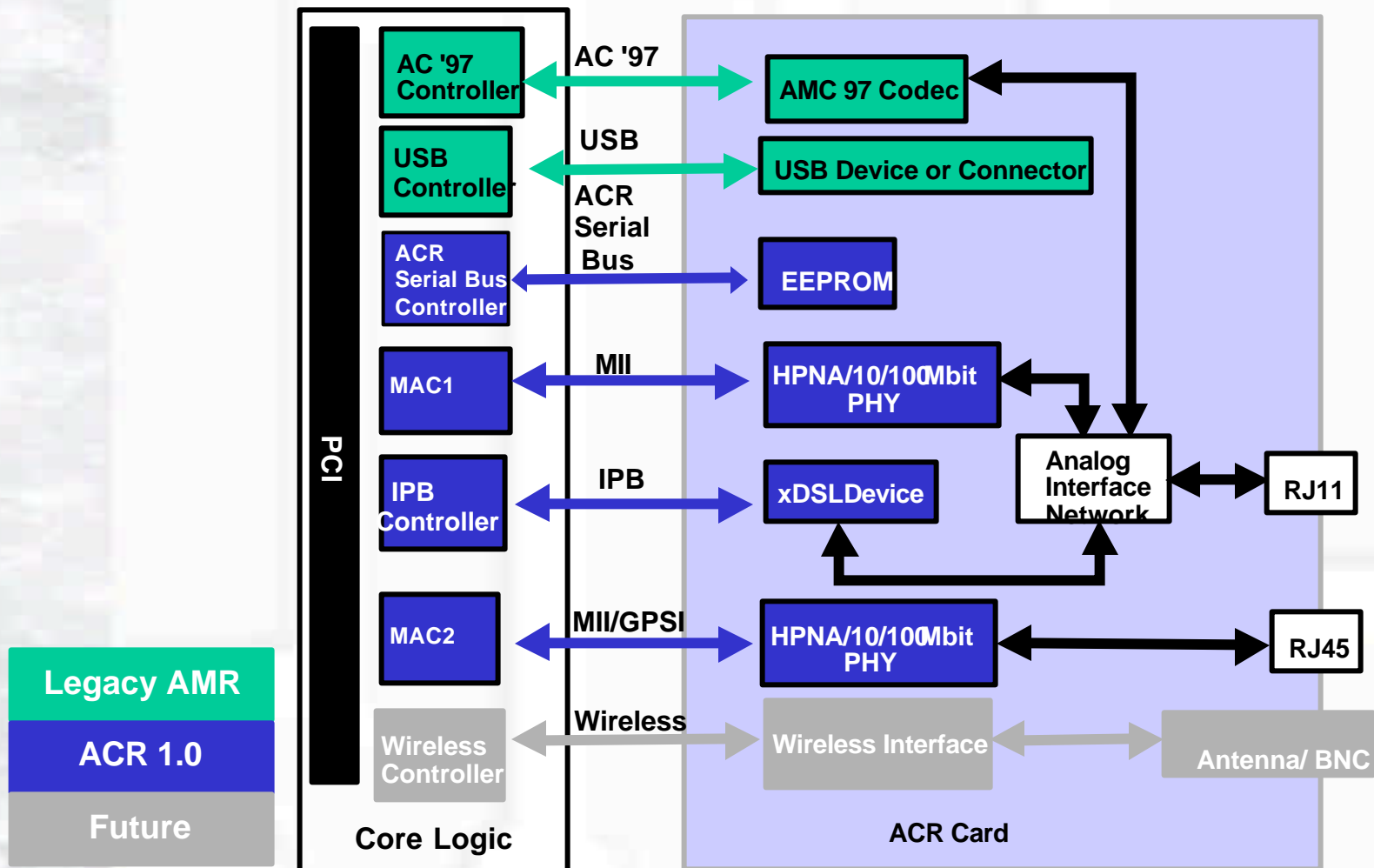
- ✍ Keyboard/mouse controller, Super I/O, Hardware Monitoring
- ✍ SMBus, UDMA 33/66/100, Audio/Modem controllers
- ✍ Ethernet MAC
- ✍ DSL (IPB), USB 2.0, IEEE-1394, Serial-ATA in the future

# Trend of Future PC's

- All standard features of a PC are built into motherboard
- All PC's are connected through one or more links
- More communication options are supported directly by core-logic chipset instead of relying on PCI bus
- Upgrades and communication options are added through low-cost multi-function riser cards
- Fewer PCI slots are needed
- Better support for plug-n-play and manageability
- PC's are becoming more like home appliances



# Introduction – ACR Architecture



# **Benefit of Core-logic Integration - Performance**

- **Higher throughput rate through point-to-point interconnects**
- **Better arbitration scheme with integrated device controllers**
- **Lower power consumption with thin Interfaces**
- **Better signal quality by separating digital and analog sections**

# **Benefit of Core-logic Integration – Reliability**

- **Integrated communication/audio controllers reduce component count in the system**
- **Thin interfaces reduce contact/soldering points in the system**
- **Point-to-point connection isolates faults**
- **Separation of digital and analog functions allows the use of most suitable process technology for controller and PHY individually**

# Benefit of Core-logic Integration – Compatibility

- **Tests for completely open-system can never be complete**

- ✍ #chipsets (vendor, CPU, memory, feature, etc.)
- ✍ #devices (vendor, product types)
- ✍ #PCI slots (combination of devices on each system)
- ✍ #BIOS (each BIOS vendor and revision for all of above)

- **Integrated controllers in core-logic reduce test matrix drastically compared to PCI solutions**

- ✍ #Southbridge << #Northbridge

- **Point-to-point connection eliminates tests between riser/add-on cards**

- ✍ Combination is limited to multi-function on each riser

# Benefit of Core-logic Integration – Cost and Flexibility

## ■ Chipset with integrated controllers

- ✍ Lower BOM cost due to reduced components
- ✍ Lower NRE cost due to easier implementation

## ■ ACR Riser with industry standard interfaces

- ✍ Opens the door for multi-function cards with devices from multiple vendors
- ✍ Enables CTO & BTO without the need for specialized motherboards or costly PCI cards
- ✍ Lower manufacturing cost as devices are cheaper and riser cards requires smaller PCB than stand-alone PCI devices
- ✍ Lower system cost from simplified validation and certification
- ✍ Lower production risk with multiple suppliers
- ✍ Has longevity as new applications can be added through standardized interfaces (e.g. IPB for lowest cost soft DSL)

# Networking with ACR

<b>Internet Access</b>	<b>Local Network</b>	<b>ACR Interfaces</b>
<b>Analog Modem</b>		<b>ACLink</b>
<b>DSL</b>		<b>IPB/USB/MII</b>
	<b>10/100 Ethernet</b>	<b>MII</b>
	<b>HomePNA 1.0/2.0</b>	<b>MII</b>
<b>Analog Modem</b>	<b>HomePNA 1.0</b>	<b>ACLink + MII</b>
<b>Cable Modem</b>	<b>10/100 Ethernet</b>	<b>MII + MII</b>
<b>Cable Modem</b>	<b>HomePNA 2.0</b>	<b>MII + MII</b>
<b>External DSL</b>	<b>10/100 Ethernet</b>	<b>MII/USB + MII</b>
<b>Internal DSL</b>	<b>HomePNA 2.0</b>	<b>IPB/USB + MII</b>
	<b>...Bluetooth</b>	<b>USB/</b>
	<b>...802.11/HomeRF</b>	<b>Wireless ext.</b>



# Market Opportunities

## ■ PC sales is expected to hit 150M in 2001 (IDC)

- ✍ Almost all of them uses chipset with integrated audio/modem controllers
- ✍ At least 40M will use core-logic with integrated MAC with MII interface
- ✍ Network option for Internet access is required for every PC
- ✍ ACR solution keeps the cost of PC down

## ■ Home networking is becoming a necessity

- ✍ US alone has 21M households interested in home networking
- ✍ Among them 12.4M will do so within a year (Yankee Group)
- ✍ ACR solution provides a wide variety of communication configurations with low cost
- ✍ ACR and Microsoft OS makes it easy to turn PC's at Internet access point into residential gateway for Internet sharing

# Summary

- **The combination of core-logic integration and ACR standard**

- ✍ enhances reliability and compatibility of PC systems
- ✍ enables low-cost yet flexible network solutions for the primary PC in the house
- ✍ lowers the cost, and eases the installation of the 2<sup>nd</sup> & 3<sup>rd</sup> PC's

- **ACR is the standard for future communication-enabled platforms.**

**Be part of it!!**